The ever increasing dependence on limited fossil fuel resources and resulting pollution have created an urgent need for cleaner fuel sources in pursuit of a more secure energy future. One alternative fuel source is hydrogen. Unlike fossil fuels, which produce energy by combustion and yield polluting byproducts, hydrogen is consumed by chemical reaction with oxygen forming only water as a byproduct. Thus, hydrogen has enormous potential as a clean power source for future generation of automobiles.

There is great interest in developing hydrogen powered devices, especially hydrogen powered automobiles. One prerequisite for this application is that there is enough hydrogen to give comparable driving ranges as conventionally fueled automobiles. However, hydrogen poses the problem of very low density. To overcome this obstacle, cryogenic storage containers filled with metal hydrides have been developed to store enough hydrogen in its liquid form to match its convention rival. However, with this technology, there is a requirement to heat the liquid hydrogen to make it available for use.

Researchers at Purdue University have developed a unique modular heat exchanger for use in hydrogen fuel cells. The internal design optimizes both pellet contact area for increased heat transfer and hydride pellet capacity. Additionally, the modular design allows for easy replacement of defective or malfunctioning modules. These highly efficient heat exchangers can provide the necessary heat to evaporate the liquid hydrogen while remaining compact and durable enough for use over the broad range of temperatures and under the high environmental pressure of a hydrogen storage tank.
Advantages:
- Modular design makes repairs/replacements easy
- Durable design

Potential Applications:
- Green Technology
- Clean Energy

People:
- Mudawar, Issam (Project leader)
- Pourpoint, Timothee Louis
- Visaria, Milan
- Zhang, Hui

Intellectual Property:

Application Date: July 29, 2011
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Contact OTC:
Purdue Office of Technology Commercialization
1801 Newman Road
West Lafayette, IN 47906

Phone: (765) 588-3475
Fax: (765) 463-3486
Email: otcip@prf.org